

ABSTRACT OF THE DISCLOSURE

A method for manufacturing a semiconductor device having on a silicon substrate semiconductor elements and aluminum (Al) alloy wiring leads as electrically connected thereto is disclosed. The method includes the steps of forming on the silicon substrate an Al alloy layer containing therein copper (Cu), and forming on the Al alloy layer a titanium nitride (TiN) film with enhanced chemical reactivity by using sputtering techniques while applying thereto a DC power of 5.5 W/cm² or less. Fabrication of such reactivity-rich TiN film on the Al alloy layer results in a reaction layer of Al and Ti being subdivided into several spaced-apart segments. In this case, the reaction layer hardly serves as any diffusion path; thus, it becomes possible to prevent Cu as contained in the Al alloy layer from attempting to outdiffuse with the reaction layer being as its diffusion path. This makes it possible to suppress or minimize unwanted fabrication of AlN on or above the surface of an Al containing lead pattern, thereby enabling increase in electromigration (EM) lifetime of electrical interconnect leads used.